

ASTRODYNAMICS SYMPOSIUM (C1)  
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## CONCEPT DESIGN FOR A SATELLITE WITH MICRO VIBRATION ISOLATOR

**Abstract**

Information about the galaxy formation and evolution can be obtained by the observation satellites. For this type of satellites, high pointing accuracy is needed when the satellite is observing the targets far from the Earth. Disturbance is one of the problems that affect the pointing accuracy and it may be observed as vibrations in one form. Vibrations are mainly caused by the equipment onboard the bus part and may transmit to the mission part easily. The conventional methods proposed for vibration isolation hardly cut off the vibration at low frequency band passively. Furthermore if the isolator is composed of a mechanical part, its performance may deteriorate as the frequency response changes together with the space environment temperature.

In this study, we propose a micro vibration isolator that uses the flux pinning effect. The flux pinning effect is generated between a type-II superconductor and the materials with magnetic flux. By use of this effect the relative distance and attitude between the type-II superconductor and the magnetic material can be maintained. It works as a retentive force if the attitude or distance is disturbed. Moreover we may approximate this force by spring-damping force.

The proposed micro vibration isolator has permanent magnets, type-II superconductors and magnetic coils. The mission part and bus part are connected by the flux pinning effect. The numerical analyses for the proposed isolator show that it can cut off the low frequency vibrations. In addition the relative attitude between the parts can be controlled by the magnetic coil, by changing the amount of generated magnetic flux when the type-II superconductor is cooled down the critical temperature. The numerical analyses are supported by the experiments.